

SUPPLEMENT TO REPORT OF PROFESSOR DAVID M. CUTLER

IN RE: NATIONAL PRESCRIPTION OPIATE LITIGATION, CASE NO. 1:17-MD-2804

CASE TRACK 3, LAKE AND TRUMBULL COUNTIES

APRIL 21, 2021

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Pursuant to Paragraph 191, FN 160 of my report disclosed on April 16, 2021, I reserved the right to supplement my calculations based on the final numbers provided by Dr. Craig McCann in his report. This supplement reflects the final numbers in Dr. McCann's April 16, 2021 report. The revised footnotes, paragraphs, exhibits, and appendices are set forth below. In particular, based on Dr. McCann's final numbers, revisions were necessary to footnotes 161-162; paragraphs 191, 193, 195, and 208; Exhibits 51-53; and Appendices 12-13. I am also disclosing two excel files as backup which reflect the updated calculations set forth in Exhibits 51-53 and Appendices 12-13.

April 21, 2021



David M. Cutler

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FN 161: See McCann Report, Section X.E and Appendix 12.G at p. 635.

FN 162: See McCann Report, Section X.D and Appendix 12.G at p. 635.

Paragraph 191:

Dr. McCann estimates that in their role as dispensers, defendants together accounted for 48 percent of MMEs dispensed in Trumbull County and 59 percent of MMEs dispensed in Lake County between 2006-10. Dr. McCann estimates that in their role as distributors, defendants together accounted for 17 percent of MMEs sold in Trumbull County and 36 of MMEs sold in Lake County between 2006-10. He estimates that between 2006-10, 74 percent of total MMEs in Trumbull County should have been identified as suspicious under Scenario 1, 96 percent under Scenario 2, and 69 percent under Scenario 3. Over the same period in Lake County, he estimates that 71 percent should have been identified as suspicious under Scenario 1, 95 percent under Scenario 2, and 69 percent under Scenario 3.

Paragraph 193:

Estimates of opioid mortality attributable to defendants' misconduct in 2009-10 and 2018-19 involve the following steps:

- The regression analysis reported in Appendix 9 Table 1 establishes the estimated magnitude of the relationship across counties between (i) shipments of prescription opioids (measured in MMEs per capita per day) between 1997-2010 and (ii) the change in mortality rates between 1993-95 and 2009-10. The regression model yields a prediction of county-specific average annual opioid mortality expected in the absence of any shipments of prescription opioids in 2009-10 (row e).

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- Comparison of actual county-specific mortality (row d) yields an estimate of the increase in the opioid mortality rate attributable to all shipments (row f). Under Scenario 2, 56 percent of total MMEs in Lake County (and 46 percent in Trumbull County) should have been flagged as suspicious by defendants (row c), so I assume that defendants account for 56 percent of the increase in mortality estimated to be attributable to shipments of prescription opioids in Lake County (and 46 percent in Trumbull County). Together, these results imply that defendants' misconduct raised the average annual opioid mortality rate in 2009-10 by 2.51 per 100,000 in Lake County and 2.89 per 100,000 in Trumbull County (row g). Based on area population, this translates to an annual average of 4.7 deaths in Lake County and 5.0 deaths in Trumbull County in 2009-10 that are attributable to defendants' misconduct.
- The county-specific estimate of opioid overdose rates in Trumbull and Lake counties expected in the absence of the illicit crisis in 2018-19 is based on the "indirect" analysis, as summarized in Exhibit 50 above. The expected mortality rates as of 2018-19 based on this approach are reported in row l of Exhibit 51. The difference between (i) the actual mortality in 2018-2019 (row k); and (ii) expected mortality (row l) reflects the elevation in the opioid mortality rate between 2009-10 and 2018-19 due to shipments of prescription opioids (and is reported in row m).
- I again attribute 56 percent of the incremental mortality in 2018-19 in Lake County (and 46 percent in Trumbull County) to defendants' misconduct based on the Scenario 2 analysis, as reflect in row c. The resulting estimate of the incremental

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annual mortality rate in 2018-2019 that is attributable to defendants: 14.78 deaths per 100,000 in Lake County and 16.79 deaths per 100,000 in Trumbull County (as reported in row n).

- The overall average annual impact of the defendants' misconduct in 2018-19 is calculated as the sum of the estimates of the impact of defendants' misconduct in 2009-10 and 2018-19. Together, these results indicate that defendants' misconduct elevated the opioid mortality rate by 17.29 deaths per 100,000 residents in Lake County and by 19.68 deaths per 100,000 residents in Trumbull County (row p). This in turn implies that in 2018-19, defendants' misconduct resulted in an average of 33.4 deaths per year in Lake County and 32.5 deaths per year in Trumbull County (row q).

Paragraph 195:

Overall, the results for Scenario 2 indicate that 241.2 deaths in Trumbull County and 243.7 deaths in Lake County were attributable to defendants' misconduct for 1996 through 2019. Results of this analysis for Scenarios 1-3 are summarized in Exhibit 53. The detailed results for each these calculations are presented in Appendix 12.

Paragraph 208:

My analysis, together with analysis by other experts, conservatively estimates that defendants' misconduct resulted in 243 deaths in Lake County and 241 deaths in Trumbull County between 1996 and 2019, and in turn the host of economic and social problems that result from excessive opioids. The number of deaths in these counties due to defendants'

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misconduct will unfortunately continue to grow in the future as preliminary national data for 2020 indicate that opioid mortality increased from 2019 levels.

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Exhibit 51
Impact of Defendants on Annual Total Opioid Mortality in 2009-2010 and 2018-2019
Scenario 2: Based on McCann Dispenser Analysis with Recurrent Flags

		County	
		Lake County	Trumbull County
Defendants' Flagged MMEs			
Defendants' Percent of Total MMEs (2006-2010)	<i>a</i>	59%	48%
Flagged Percent of Defendants' MME (2006-2010)	<i>b</i>	95%	96%
Defendants' Flagged MMEs as Percent of Total	<i>c=a*b</i>	56%	46%
Impact on Mortality through 2009-2010			
Actual Opioid Mortality Rate in 2009-2010	<i>d</i>	12.68	18.75
Predicted Mortality Rate in 2009-2010 (Direct Regression on Change from 1993-95 to 2009-10)	<i>e</i>	8.22	12.50
Mortality Rate in 2009-10 Attributable to All Shipments	<i>f=d-e</i>	4.46	6.25
Mortality Rate in 2009-10 Attributable to Defendants	<i>g=f*c</i>	2.51	2.89
Percent of Mortality Rate in 2009-2010 Attributable to Defendants	<i>h=g/d</i>	20%	15%
County Adult Population in 2009-2010	<i>i</i>	188,356	172,620
Annual Opioid-Related Deaths (2009-2010 Average) Attributable to Defendants	<i>j=g*(i/100,000)</i>	4.7	5.0
Incremental Impact on Mortality through 2018-2019			
Actual Opioid Mortality Rate 2018-2019	<i>k</i>	34.12	50.39
Predicted Mortality Rate in 2018-19 (Indirect Regression based on 2009-10 Predicted for 2018-19)	<i>l</i>	7.83	14.02
Incremental Mortality Rate in 2018-19 Attributable to All Shipments	<i>m=k-l</i>	26.28	36.37
Incremental Mortality Rate in 2018-19 Attributable to Defendants	<i>n=m*c</i>	14.78	16.79
Total Impact on Mortality through 2018-2019			
Total Mortality Rate in 2018-19 Attributable to All Shipments	<i>o=f+m</i>	30.74	42.63
Total Mortality Rate in 2018-19 Attributable to Defendants	<i>p=g+n</i>	17.29	19.68
Percent of 2018-19 Mortality Rate Attributable to Defendants	<i>q=p/k</i>	51%	39%
County Adult Population in 2018-2019	<i>r</i>	193,073	165,166
Annual Opioid-Related Deaths (2018-19 Average) Attributable to Defendants	<i>s=p*(r/100,000)</i>	33.4	32.5

Notes: Flagged MMEs based on 2006-2010 MMEs per McCann Section X.D and Appendix 12.G at p. 365.
Mortality rates based on any opioid overdose deaths per 100,000 adults (age 15+).

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Exhibit 52

Impact of Defendants on Annual Total Opioid Mortality By Year
Scenario 2: Based on McCann Dispenser Analysis with Recurrent Flags

Period	Lake County				Trumbull County				$h=e*f$ $/100,000$
	Actual Mortality Rate	Percent Attributable to Defendants	Mortality Rate Attributable to Defendants	Number of Deaths Attributable to Defendants	Actual Mortality Rate	Percent Attributable to Defendants	Mortality Rate Attributable to Defendants	Number of Deaths Attributable to Defendants	
	a	b	$c=a*b$	$d=c*population/100,000$	e	f	$g=e*f$		
Avg. 1993-1995	1.24	0%	0.00	0.0	0.81	0%	0.00	0.0	
1996	2.40	1%	0.03	0.1	1.95	1%	0.02	0.0	
1997	3.01	3%	0.09	0.2	0.17	2%	0.00	0.0	
1998	1.97	4%	0.08	0.2	4.13	3%	0.14	0.2	
1999	3.85	6%	0.22	0.4	4.70	4%	0.21	0.4	
2000	3.84	7%	0.27	0.5	4.62	5%	0.25	0.5	
2001	2.19	8%	0.19	0.3	5.87	7%	0.39	0.7	
2002	5.47	10%	0.54	1.0	10.68	8%	0.82	1.5	
2003	1.09	11%	0.12	0.2	7.68	9%	0.68	1.2	
2004	6.52	13%	0.83	1.5	17.52	10%	1.73	3.1	
2005	8.13	14%	1.15	2.1	13.25	11%	1.46	2.6	
2006	9.70	16%	1.51	2.8	17.22	12%	2.08	3.7	
2007	12.55	17%	2.13	4.0	29.30	13%	3.87	6.8	
2008	11.68	18%	2.15	4.0	19.46	14%	2.78	4.8	
Avg. 2009-2010	12.68	20%	2.51	4.7	18.75	15%	2.89	5.0	
2011	21.96	24%	5.19	9.8	29.51	18%	5.42	9.3	
2012	22.17	28%	6.10	11.6	18.09	21%	3.86	6.6	
2013	20.49	31%	6.43	12.2	20.62	24%	5.00	8.5	
2014	26.11	35%	9.20	17.5	30.75	27%	8.37	14.2	
2015	25.65	39%	10.03	19.2	50.64	30%	15.28	25.8	
2016	47.70	43%	20.49	39.2	60.86	33%	20.17	33.8	
2017	45.25	47%	21.18	40.7	70.64	36%	25.50	42.5	
Avg. 2018-2019	34.12	51%	17.29	33.4	50.39	39%	19.68	32.5	
Total Deaths Attributable to Defendants (1996-2019)				243.7				241.2	

Notes:

Mortality rates based on any opioid overdose deaths per 100,000 adults (age 15+).

Mortality attributable to defendants in 2009-2010 and 2018-2019 based on McCann Section X.D and regression analysis described above.

Mortality attributable to defendants in intervening years based on linear growth in attribution rate.

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Exhibit 53**Impact of Defendants on Annual Total Opioid Mortality
Total Number of Deaths Attributable to Defendants, 1996-2019**

Scenario	Approach	County	
		Lake County	Trumbull County
1	Dispenser Analysis, Non-Recurrent, 2006-2010 [1]	181.3	187.1
2	Dispenser Analysis, Recurrent, 2006-2010 [2]	243.7	241.2
3	Distributor Analysis, 2006-2010 [3]	108.1	59.5

Notes:

[1] Flagged MMEs based on 2006-2010 MMEs per McCann Section X.E and Appendix 12.G at p. 365.

[2] Flagged MMEs based on 2006-2010 MMEs per McCann Section X.D and Appendix 12.G at p. 365.

[3] Flagged MMEs based on 2006-2010 MMEs per McCann Section VII.A.

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Appendix 12: Impact of Defendants on Total Opioid Mortality**Appendix Exhibit 12.1****Impact of Defendants on Annual Total Opioid Mortality in 2009-2010 and 2018-2019****Scenario 1: Based on McCann Dispenser Analysis with Non-Recurrent Flags**

		County	
		Lake County	Trumbull County
Defendants' Flagged MMEs			
Defendants' Percent of Total MMEs (2006-2010)	<i>a</i>	59%	48%
Flagged Percent of Defendants' MME (2006-2010)	<i>b</i>	71%	74%
Defendants' Flagged MMEs as Percent of Total	<i>c=a*b</i>	42%	36%
Impact on Mortality through 2009-2010			
Actual Opioid Mortality Rate in 2009-2010	<i>d</i>	12.68	18.75
Predicted Mortality Rate in 2009-2010 (Direct Regression on Change from 1993-95 to 2009-10)	<i>e</i>	8.22	12.50
Mortality Rate in 2009-10 Attributable to All Shipments	<i>f=d-e</i>	4.46	6.25
Mortality Rate in 2009-10 Attributable to Defendants	<i>g=f*c</i>	1.86	2.24
Percent of Mortality Rate in 2009-2010 Attributable to Defendants	<i>h=g/d</i>	15%	12%
County Adult Population in 2009-2010	<i>i</i>	188,356	172,620
Annual Opioid-Related Deaths (2009-2010 Average) Attributable to Defendants	<i>j=g*(i/100,000)</i>	3.5	3.9
Incremental Impact on Mortality through 2018-2019			
Actual Opioid Mortality Rate 2018-2019	<i>k</i>	34.12	50.39
Predicted Mortality Rate in 2018-19 (Indirect Regression based on 2009-10 Predicted for 2018-19)	<i>l</i>	7.83	14.02
Incremental Mortality Rate in 2018-19 Attributable to All Shipments	<i>m=k-l</i>	26.28	36.37
Incremental Mortality Rate in 2018-19 Attributable to Defendants	<i>n=m*c</i>	11.00	13.02
Total Impact on Mortality through 2018-2019			
Total Mortality Rate in 2018-19 Attributable to All Shipments	<i>o=f+m</i>	30.74	42.63
Total Mortality Rate in 2018-19 Attributable to Defendants	<i>p=g+n</i>	12.86	15.26
Percent of 2018-19 Mortality Rate Attributable to Defendants	<i>q=p/k</i>	38%	30%
County Adult Population in 2018-2019	<i>r</i>	193,073	165,166
Annual Opioid-Related Deaths (2018-19 Average) Attributable to Defendants	<i>s=p*(r/100,000)</i>	24.8	25.2

Notes: Flagged MMEs based on 2006-2010 MMEs per McCann Section X.E and Appendix 12.G at p. 365.
Mortality rates based on any opioid overdose deaths per 100,000 adults (age 15+).

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Appendix Exhibit 12.2
Impact of Defendants on Annual Total Opioid Mortality By Year
Scenario 1: Based on McCann Dispenser Analysis with Non-Recurrent Flags

Period	Lake County				Trumbull County			
	Actual Mortality Rate	Percent Attributable to Defendants	Mortality Rate Attributable to Defendants	Number of Deaths Attributable to Defendants	Actual Mortality Rate	Percent Attributable to Defendants	Mortality Rate Attributable to Defendants	Number of Deaths Attributable to Defendants
	a	b	c=a*b	d=c*population /100,000	e	f	g=e*f	h=e*population /100,000
Avg. 1993-1995	1.24	0%	0.00	0.0	0.81	0%	0.00	0.0
1996	2.40	1%	0.03	0.0	1.95	1%	0.02	0.0
1997	3.01	2%	0.06	0.1	0.17	2%	0.00	0.0
1998	1.97	3%	0.06	0.1	4.13	3%	0.11	0.2
1999	3.85	4%	0.16	0.3	4.70	3%	0.16	0.3
2000	3.84	5%	0.20	0.4	4.62	4%	0.20	0.4
2001	2.19	6%	0.14	0.3	5.87	5%	0.30	0.5
2002	5.47	7%	0.40	0.7	10.68	6%	0.64	1.1
2003	1.09	8%	0.09	0.2	7.68	7%	0.52	0.9
2004	6.52	9%	0.62	1.1	17.52	8%	1.34	2.4
2005	8.13	11%	0.85	1.6	13.25	9%	1.13	2.0
2006	9.70	12%	1.12	2.1	17.22	9%	1.62	2.8
2007	12.55	13%	1.58	3.0	29.30	10%	3.00	5.2
2008	11.68	14%	1.60	3.0	19.46	11%	2.16	3.7
Avg. 2009-2010	12.68	15%	1.86	3.5	18.75	12%	2.24	3.9
2011	21.96	18%	3.86	7.3	29.51	14%	4.20	7.2
2012	22.17	20%	4.54	8.6	18.09	17%	2.99	5.1
2013	20.49	23%	4.78	9.1	20.62	19%	3.88	6.6
2014	26.11	26%	6.84	13.0	30.75	21%	6.49	11.0
2015	25.65	29%	7.46	14.2	50.64	23%	11.85	20.0
2016	47.70	32%	15.24	29.2	60.86	26%	15.64	26.2
2017	45.25	35%	15.76	30.3	70.64	28%	19.78	33.0
Avg. 2018-2019	34.12	38%	12.86	24.8	50.39	30%	15.26	25.2
Total Deaths Attributable to Defendants (1996-2019)				181.3				187.1

Notes:

Mortality rates based on any opioid overdose deaths per 100,000 adults (age 15+).

Mortality attributable to defendants in 2009-2010 and 2018-2019 based on McCann Section X.E and regression analysis described above.

Mortality attributable to defendants in intervening years based on linear growth in attribution rate.

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Appendix Exhibit 12.3
Impact of Defendants on Annual Total Opioid Mortality in 2009-2010 and 2018-2019
Scenario 3: Based on McCann Distributor Analysis

		County	
		Lake County	Trumbull County
Defendants' Flagged MMEs			
Defendants' Percent of Total MMEs (2006-2010)	<i>a</i>	36%	17%
Flagged Percent of Defendants' MME (2006-2010)	<i>b</i>	69%	69%
Defendants' Flagged MMEs as Percent of Total	<i>c=a*b</i>	25%	11%
Impact on Mortality through 2009-2010			
Actual Opioid Mortality Rate in 2009-2010	<i>d</i>	12.68	18.75
Beta on Shipments from Model 1		4.04	4.04
Actual Shipments 1997-2010		1.10	1.55
Impact of Shipments as of 2009-2010		4.46	6.25
Predicted Mortality Rate in 2009-2010 (Direct Regression on Change from 1993-95 to 2009-10)	<i>e</i>	8.22	12.50
Mortality Rate in 2009-10 Attributable to All Shipments	<i>f=d-e</i>	4.46	6.25
Mortality Rate in 2009-10 Attributable to Defendants	<i>g=f*c</i>	1.11	0.71
Percent of Mortality Rate in 2009-2010 Attributable to Defendants	<i>h=g/d</i>	9%	4%
County Adult Population in 2009-2010	<i>i</i>	188,356	172,620
Annual Opioid-Related Deaths (2009-2010 Average) Attributable to Defendants	<i>j=g*(i/100,000)</i>	2.1	1.2
Incremental Impact on Mortality through 2018-2019			
Actual Opioid Mortality Rate 2018-2019	<i>k</i>	34.12	50.39
Predicted Mortality Rate in 2018-19 (Indirect Regression based on 2009-10 Predicted for 2018-19)	<i>l</i>	7.83	14.02
Incremental Mortality Rate in 2018-19 Attributable to All Shipments	<i>m=k-l</i>	26.28	36.37
Incremental Mortality Rate in 2018-19 Attributable to Defendants	<i>n=m*c</i>	6.56	4.14
Total Impact on Mortality through 2018-2019			
Total Mortality Rate in 2018-19 Attributable to All Shipments	<i>o=f+m</i>	30.74	42.63
Total Mortality Rate in 2018-19 Attributable to Defendants	<i>p=g+n</i>	7.67	4.85
Percent of 2018-19 Mortality Rate Attributable to Defendants	<i>q=p/k</i>	22%	10%
County Adult Population in 2018-2019	<i>r</i>	193,073	165,166
Annual Opioid-Related Deaths (2018-19 Average) Attributable to Defendants	<i>s=p*(r/100,000)</i>	14.8	8.0

Notes: Flagged MMEs based on 2006-2010 MMEs per McCann Section VII.A.

Mortality rates based on any opioid overdose deaths per 100,000 adults (age 15+).

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Appendix Exhibit 12.4
Impact of Defendants on Annual Total Opioid Mortality By Year
Scenario 3: Based on McCann Distributor Analysis

Period	Lake County				Trumbull County				$h=e*f$ $h=e*population/100,000$
	Actual Mortality Rate	Percent Attributable to Defendants	Mortality Rate Attributable to Defendants	Number of Deaths Attributable to Defendants	Actual Mortality Rate	Percent Attributable to Defendants	Mortality Rate Attributable to Defendants	Number of Deaths Attributable to Defendants	
	a	b	c=a*b	$d=c*population/100,000$	e	f	g=e*f	$h=e*population/100,000$	
Avg. 1993-1995	1.24	0%	0.00	0.0	0.81	0%	0.00	0.0	
1996	2.40	1%	0.02	0.0	1.95	0%	0.01	0.0	
1997	3.01	1%	0.04	0.1	0.17	1%	0.00	0.0	
1998	1.97	2%	0.04	0.1	4.13	1%	0.03	0.1	
1999	3.85	3%	0.10	0.2	4.70	1%	0.05	0.1	
2000	3.84	3%	0.12	0.2	4.62	1%	0.06	0.1	
2001	2.19	4%	0.08	0.2	5.87	2%	0.10	0.2	
2002	5.47	4%	0.24	0.4	10.68	2%	0.20	0.4	
2003	1.09	5%	0.05	0.1	7.68	2%	0.17	0.3	
2004	6.52	6%	0.37	0.7	17.52	2%	0.43	0.8	
2005	8.13	6%	0.51	0.9	13.25	3%	0.36	0.6	
2006	9.70	7%	0.67	1.2	17.22	3%	0.51	0.9	
2007	12.55	8%	0.94	1.8	29.30	3%	0.95	1.7	
2008	11.68	8%	0.95	1.8	19.46	4%	0.69	1.2	
Avg. 2009-2010	12.68	9%	1.11	2.1	18.75	4%	0.71	1.2	
2011	21.96	10%	2.30	4.4	29.51	5%	1.34	2.3	
2012	22.17	12%	2.71	5.1	18.09	5%	0.95	1.6	
2013	20.49	14%	2.85	5.4	20.62	6%	1.23	2.1	
2014	26.11	16%	4.08	7.8	30.75	7%	2.06	3.5	
2015	25.65	17%	4.45	8.5	50.64	7%	3.77	6.4	
2016	47.70	19%	9.09	17.4	60.86	8%	4.97	8.3	
2017	45.25	21%	9.40	18.1	70.64	9%	6.29	10.5	
Avg. 2018-2019	34.12	22%	7.67	14.8	50.39	10%	4.85	8.0	
Total Deaths Attributable to Defendants (1996-2019)				108.1				59.5	

Notes:

Mortality rates based on any opioid overdose deaths per 100,000 adults (age 15+).

Mortality attributable to defendants in 2009-2010 and 2018-2019 based on McCann Section VII.A and regression analysis described above.

Mortality attributable to defendants in intervening years based on linear growth in attribution rate.

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Appendix 13: Impact of Defendants on Total Opioid Mortality – Alternative Treatment of 1997-2005 Shipments

Appendix Exhibit 13.1

**Impact of Defendants on Annual Total Opioid Mortality
Total Number of Deaths Attributable to Defendants, 1996-2019
Based on 50% of 2006-2010 Average for 1997-2005**

Scenario	Approach	County	
		Lake County	Trumbull County
1	Dispenser Analysis, Non-Recurrent, 2006-2010 [1]	141.9	146.1
2	Dispenser Analysis, Recurrent, 2006-2010 [2]	190.8	188.4
3	Distributor Analysis, 2006-2010 [3]	84.6	46.4

Notes:

[1] Flagged MMEs based on 2006-2010 MMEs per McCann Section X.E and Appendix 12.G at p. 365.

[2] Flagged MMEs based on 2006-2010 MMEs per McCann Section X.D and Appendix 12.G at p. 365.

[3] Flagged MMEs based on 2006-2010 MMEs per McCann Section VII.A.

For calculation, flagged MME percentages for 1997-2005 set to 50% of 2006-2010 average.

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Appendix Exhibit 13.2**Impact of Defendants on Annual Total Opioid Mortality in 2009-2010 and 2018-2019****Scenario 1: Based on McCann Dispenser Analysis with Non-Recurrent Flags
Based on 50% of 2006-2010 Average for 1997-2005**

		County	
		Lake County	Trumbull County
Defendants' Flagged MMEs			
Defendants' Percent of Total MMEs (1997-2010)	<i>a</i>	59%	48%
Flagged Percent of Defendants' MME (1997-2010)	<i>b</i>	56%	58%
Defendants' Flagged MMEs as Percent of Total	<i>c=a*b</i>	33%	28%
Impact on Mortality through 2009-2010			
Actual Opioid Mortality Rate in 2009-2010	<i>d</i>	12.68	18.75
Predicted Mortality Rate in 2009-2010 (Direct Regression on Change from 1993-95 to 2009-10)	<i>e</i>	8.22	12.50
Mortality Rate in 2009-10 Attributable to All Shipments	<i>f=d-e</i>	4.46	6.25
Mortality Rate in 2009-10 Attributable to Defendants	<i>g=f*c</i>	1.46	1.75
Percent of Mortality Rate in 2009-2010 Attributable to Defendants	<i>h=g/d</i>	12%	9%
County Adult Population in 2009-2010	<i>i</i>	188,356	172,620
Annual Opioid-Related Deaths (2009-2010 Average) Attributable to Defendants	<i>j=g*(i/100,000)</i>	2.7	3.0
Incremental Impact on Mortality through 2018-2019			
Actual Opioid Mortality Rate 2018-2019	<i>k</i>	34.12	50.39
Predicted Mortality Rate in 2018-19 (Indirect Regression based on 2009-10 Predicted for 2018-19)	<i>l</i>	7.83	14.02
Incremental Mortality Rate in 2018-19 Attributable to All Shipments	<i>m=k-l</i>	26.28	36.37
Incremental Mortality Rate in 2018-19 Attributable to Defendants	<i>n=m*c</i>	8.61	10.17
Total Impact on Mortality through 2018-2019			
Total Mortality Rate in 2018-19 Attributable to All Shipments	<i>o=f+m</i>	30.74	42.63
Total Mortality Rate in 2018-19 Attributable to Defendants	<i>p=g+n</i>	10.07	11.92
Percent of 2018-19 Mortality Rate Attributable to Defendants	<i>q=p/k</i>	30%	24%
County Adult Population in 2018-2019	<i>r</i>	193,073	165,166
Annual Opioid-Related Deaths (2018-19 Average) Attributable to Defendants	<i>s=p*(r/100,000)</i>	19.4	19.7

Notes: Flagged MMEs based on 2006-2010 MMEs per McCann Section X.E and Appendix 12.G at p. 365.

Mortality rates based on any opioid overdose deaths per 100,000 adults (age 15+).

For calculation, flagged MME percentages for 1997-2005 set to 50% of 2006-2010 average.

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Appendix Exhibit 13.3

Impact of Defendants on Annual Total Opioid Mortality By Year
Scenario 1: Based on McCann Dispenser Analysis with Non-Recurrent Flags
Based on 50% of 2006-2010 Average for 1997-2005

Period	Lake County				Trumbull County				$h=e^*population/100,000$
	Actual Mortality Rate	Percent Attributable to Defendants	Mortality Rate Attributable to Defendants	Number of Deaths Attributable to Defendants	Actual Mortality Rate	Percent Attributable to Defendants	Mortality Rate Attributable to Defendants	Number of Deaths Attributable to Defendants	
	a	b	$c=a^*b$	$d=c^*population/100,000$	e	f	$g=e^*f$		
Avg. 1993-1995	1.24	0%	0.00	0.0	0.81	0%	0.00	0.0	
1996	2.40	1%	0.02	0.0	1.95	1%	0.01	0.0	
1997	3.01	2%	0.05	0.1	0.17	1%	0.00	0.0	
1998	1.97	2%	0.05	0.1	4.13	2%	0.08	0.1	
1999	3.85	3%	0.13	0.2	4.70	3%	0.13	0.2	
2000	3.84	4%	0.16	0.3	4.62	3%	0.15	0.3	
2001	2.19	5%	0.11	0.2	5.87	4%	0.23	0.4	
2002	5.47	6%	0.31	0.6	10.68	5%	0.50	0.9	
2003	1.09	7%	0.07	0.1	7.68	5%	0.41	0.7	
2004	6.52	7%	0.48	0.9	17.52	6%	1.05	1.9	
2005	8.13	8%	0.67	1.2	13.25	7%	0.88	1.6	
2006	9.70	9%	0.88	1.6	17.22	7%	1.26	2.2	
2007	12.55	10%	1.24	2.3	29.30	8%	2.34	4.1	
2008	11.68	11%	1.25	2.3	19.46	9%	1.69	2.9	
Avg. 2009-2010	12.68	12%	1.46	2.7	18.75	9%	1.75	3.0	
2011	21.96	14%	3.02	5.7	29.51	11%	3.28	5.6	
2012	22.17	16%	3.55	6.7	18.09	13%	2.34	4.0	
2013	20.49	18%	3.74	7.1	20.62	15%	3.03	5.2	
2014	26.11	21%	5.36	10.2	30.75	16%	5.07	8.6	
2015	25.65	23%	5.84	11.2	50.64	18%	9.26	15.6	
2016	47.70	25%	11.93	22.8	60.86	20%	12.22	20.5	
2017	45.25	27%	12.34	23.7	70.64	22%	15.45	25.8	
Avg. 2018-2019	34.12	30%	10.07	19.4	50.39	24%	11.92	19.7	
Total Deaths Attributable to Defendants (1996-2019)				141.9				146.1	

Notes:

Mortality rates based on any opioid overdose deaths per 100,000 adults (age 15+).

Mortality attributable to defendants in 2009-2010 and 2018-2019 based on McCann Section X.E and regression analysis described above.

Mortality attributable to defendants in intervening years based on linear growth in attribution rate.

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Appendix Exhibit 13.4**Impact of Defendants on Annual Total Opioid Mortality in 2009-2010 and 2018-2019****Scenario 2: Based on McCann Dispenser Analysis with Recurrent Flags****Based on 50% of 2006-2010 Average for 1997-2005**

		County	
		Lake County	Trumbull County
Defendants' Flagged MMEs			
Defendants' Percent of Total MMEs (1997-2010)	<i>a</i>	59%	48%
Flagged Percent of Defendants' MME (1997-2010)	<i>b</i>	75%	75%
Defendants' Flagged MMEs as Percent of Total	<i>c=a*b</i>	44%	36%
Impact on Mortality through 2009-2010			
Actual Opioid Mortality Rate in 2009-2010	<i>d</i>	12.68	18.75
Predicted Mortality Rate in 2009-2010 (Direct Regression on Change from 1993-95 to 2009-10)	<i>e</i>	8.22	12.50
Mortality Rate in 2009-10 Attributable to All Shipments	<i>f=d-e</i>	4.46	6.25
Mortality Rate in 2009-10 Attributable to Defendants	<i>g=f*c</i>	1.96	2.26
Percent of Mortality Rate in 2009-2010 Attributable to Defendants	<i>h=g/d</i>	15%	12%
County Adult Population in 2009-2010	<i>i</i>	188,356	172,620
Annual Opioid-Related Deaths (2009-2010 Average) Attributable to Defendants	<i>j=g*(i/100,000)</i>	3.7	3.9
Incremental Impact on Mortality through 2018-2019			
Actual Opioid Mortality Rate 2018-2019	<i>k</i>	34.12	50.39
Predicted Mortality Rate in 2018-19 (Indirect Regression based on 2009-10 Predicted for 2018-19)	<i>l</i>	7.83	14.02
Incremental Mortality Rate in 2018-19 Attributable to All Shipments	<i>m=k-l</i>	26.28	36.37
Incremental Mortality Rate in 2018-19 Attributable to Defendants	<i>n=m*c</i>	11.57	13.12
Total Impact on Mortality through 2018-2019			
Total Mortality Rate in 2018-19 Attributable to All Shipments	<i>o=f+m</i>	30.74	42.63
Total Mortality Rate in 2018-19 Attributable to Defendants	<i>p=g+n</i>	13.53	15.37
Percent of 2018-19 Mortality Rate Attributable to Defendants	<i>q=p/k</i>	40%	31%
County Adult Population in 2018-2019	<i>r</i>	193,073	165,166
Annual Opioid-Related Deaths (2018-19 Average) Attributable to Defendants	<i>s=p*(r/100,000)</i>	26.1	25.4

Notes: Flagged MMEs based on 2006-2010 MMEs per McCann Section X.D and Appendix 12.G at p. 365.

Mortality rates based on any opioid overdose deaths per 100,000 adults (age 15+).

For calculation, flagged MME percentages for 1997-2005 set to 50% of 2006-2010 average.

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Appendix Exhibit 13.5

Impact of Defendants on Annual Total Opioid Mortality By Year
Scenario 2: Based on McCann Dispenser Analysis with Recurrent Flags
Based on 50% of 2006-2010 Average for 1997-2005

Period	Lake County				Trumbull County				$h=e^*population/100,000$
	Actual Mortality Rate	Percent Attributable to Defendants	Mortality Rate Attributable to Defendants	Number of Deaths Attributable to Defendants	Actual Mortality Rate	Percent Attributable to Defendants	Mortality Rate Attributable to Defendants	Number of Deaths Attributable to Defendants	
	a	b	$c=a^*b$	$d=c^*population/100,000$	e	f	$g=e^*f$		
Avg. 1993-1995	1.24	0%	0.00	0.0	0.81	0%	0.00	0.0	
1996	2.40	1%	0.03	0.0	1.95	1%	0.02	0.0	
1997	3.01	2%	0.07	0.1	0.17	2%	0.00	0.0	
1998	1.97	3%	0.07	0.1	4.13	3%	0.11	0.2	
1999	3.85	4%	0.17	0.3	4.70	3%	0.16	0.3	
2000	3.84	6%	0.21	0.4	4.62	4%	0.20	0.4	
2001	2.19	7%	0.15	0.3	5.87	5%	0.30	0.5	
2002	5.47	8%	0.42	0.8	10.68	6%	0.64	1.1	
2003	1.09	9%	0.10	0.2	7.68	7%	0.53	0.9	
2004	6.52	10%	0.65	1.2	17.52	8%	1.35	2.4	
2005	8.13	11%	0.90	1.7	13.25	9%	1.14	2.0	
2006	9.70	12%	1.18	2.2	17.22	9%	1.63	2.9	
2007	12.55	13%	1.66	3.1	29.30	10%	3.02	5.3	
2008	11.68	14%	1.68	3.2	19.46	11%	2.17	3.8	
Avg. 2009-2010	12.68	15%	1.96	3.7	18.75	12%	2.26	3.9	
2011	21.96	19%	4.06	7.7	29.51	14%	4.23	7.3	
2012	22.17	22%	4.77	9.0	18.09	17%	3.01	5.1	
2013	20.49	25%	5.03	9.6	20.62	19%	3.91	6.7	
2014	26.11	28%	7.20	13.7	30.75	21%	6.54	11.1	
2015	25.65	31%	7.85	15.0	50.64	24%	11.94	20.2	
2016	47.70	34%	16.04	30.7	60.86	26%	15.75	26.4	
2017	45.25	37%	16.58	31.9	70.64	28%	19.92	33.2	
Avg. 2018-2019	34.12	40%	13.53	26.1	50.39	31%	15.37	25.4	
Total Deaths Attributable to Defendants (1996-2019)				190.8				188.4	

Notes:

Mortality rates based on any opioid overdose deaths per 100,000 adults (age 15+).

Mortality attributable to defendants in 2009-2010 and 2018-2019 based on McCann Section X.D and regression analysis described above.

Mortality attributable to defendants in intervening years based on linear growth in attribution rate.

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Appendix Exhibit 13.6**Impact of Defendants on Annual Total Opioid Mortality in 2009-2010 and 2018-2019****Scenario 3: Based on McCann Distributor Analysis****Based on 50% of 2006-2010 Average for 1997-2005**

		County	
		Lake County	Trumbull County
Defendants' Flagged MMEs			
Defendants' Percent of Total MMEs (1997-2010)	<i>a</i>	36%	17%
Flagged Percent of Defendants' MME (1997-2010)	<i>b</i>	54%	54%
Defendants' Flagged MMEs as Percent of Total	<i>c=a*b</i>	20%	9%
Impact on Mortality through 2009-2010			
Actual Opioid Mortality Rate in 2009-2010	<i>d</i>	12.68	18.75
Beta on Shipments from Model 1		4.04	4.04
Actual Shipments 1997-2010		1.10	1.55
Impact of Shipments as of 2009-2010		4.46	6.25
Predicted Mortality Rate in 2009-2010 (Direct Regression on Change from 1993-95 to 2009-10)	<i>e</i>	8.22	12.50
Mortality Rate in 2009-10 Attributable to All Shipments	<i>f=d-e</i>	4.46	6.25
Mortality Rate in 2009-10 Attributable to Defendants	<i>g=f*c</i>	0.87	0.56
Percent of Mortality Rate in 2009-2010 Attributable to Defendants	<i>h=g/d</i>	7%	3%
County Adult Population in 2009-2010	<i>i</i>	188,356	172,620
Annual Opioid-Related Deaths (2009-2010 Average) Attributable to Defendants	<i>j=g*(i/100,000)</i>	1.6	1.0
Incremental Impact on Mortality through 2018-2019			
Actual Opioid Mortality Rate 2018-2019	<i>k</i>	34.12	50.39
Predicted Mortality Rate in 2018-19 (Indirect Regression based on 2009-10 Predicted for 2018-19)	<i>l</i>	7.83	14.02
Incremental Mortality Rate in 2018-19 Attributable to All Shipments	<i>m=k-l</i>	26.28	36.37
Incremental Mortality Rate in 2018-19 Attributable to Defendants	<i>n=m*c</i>	5.13	3.23
Total Impact on Mortality through 2018-2019			
Total Mortality Rate in 2018-19 Attributable to All Shipments	<i>o=f+m</i>	30.74	42.63
Total Mortality Rate in 2018-19 Attributable to Defendants	<i>p=g+n</i>	6.01	3.79
Percent of 2018-19 Mortality Rate Attributable to Defendants	<i>q=p/k</i>	18%	8%
County Adult Population in 2018-2019	<i>r</i>	193,073	165,166
Annual Opioid-Related Deaths (2018-19 Average) Attributable to Defendants	<i>s=p*(r/100,000)</i>	11.6	6.3

Notes: Flagged MMEs based on 2006-2010 MMEs per McCann Section VII.A.

Mortality rates based on any opioid overdose deaths per 100,000 adults (age 15+).

For calculation, flagged MME percentages for 1997-2005 set to 50% of 2006-2010 average.

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Appendix Exhibit 13.7**Impact of Defendants on Annual Total Opioid Mortality By Year****Scenario 3: Based on McCann Distributor Analysis****Based on 50% of 2006-2010 Average for 1997-2005**

Period	Lake County				Trumbull County				Number of Deaths Attributable to Defendants $h=e^*population /100,000$
	Actual Mortality Rate	Percent Attributable to Defendants	Mortality Rate Attributable to Defendants	Number of Deaths Attributable to Defendants $d=c^*population /100,000$	Actual Mortality Rate	Percent Attributable to Defendants	Mortality Rate Attributable to Defendants		
	a	b	c=a*b	d=c*population /100,000	e	f	g=e*f		
Avg. 1993-1995	1.24	0%	0.00	0.0	0.81	0%	0.00	0.0	0.0
1996	2.40	0%	0.01	0.0	1.95	0%	0.00	0.0	0.0
1997	3.01	1%	0.03	0.1	0.17	0%	0.00	0.0	0.0
1998	1.97	1%	0.03	0.1	4.13	1%	0.03	0.0	0.0
1999	3.85	2%	0.08	0.1	4.70	1%	0.04	0.1	
2000	3.84	2%	0.09	0.2	4.62	1%	0.05	0.1	
2001	2.19	3%	0.06	0.1	5.87	1%	0.07	0.1	
2002	5.47	3%	0.19	0.3	10.68	1%	0.16	0.3	
2003	1.09	4%	0.04	0.1	7.68	2%	0.13	0.2	
2004	6.52	4%	0.29	0.5	17.52	2%	0.33	0.6	
2005	8.13	5%	0.40	0.7	13.25	2%	0.28	0.5	
2006	9.70	5%	0.52	1.0	17.22	2%	0.40	0.7	
2007	12.55	6%	0.74	1.4	29.30	3%	0.74	1.3	
2008	11.68	6%	0.75	1.4	19.46	3%	0.54	0.9	
Avg. 2009-2010	12.68	7%	0.87	1.6	18.75	3%	0.56	1.0	
2011	21.96	8%	1.80	3.4	29.51	4%	1.04	1.8	
2012	22.17	10%	2.12	4.0	18.09	4%	0.74	1.3	
2013	20.49	11%	2.23	4.2	20.62	5%	0.96	1.6	
2014	26.11	12%	3.20	6.1	30.75	5%	1.61	2.7	
2015	25.65	14%	3.48	6.7	50.64	6%	2.94	5.0	
2016	47.70	15%	7.12	13.6	60.86	6%	3.88	6.5	
2017	45.25	16%	7.36	14.1	70.64	7%	4.91	8.2	
Avg. 2018-2019	34.12	18%	6.01	11.6	50.39	8%	3.79	6.3	
Total Deaths Attributable to Defendants (1996-2019)				84.6				46.4	

Notes:

Mortality rates based on any opioid overdose deaths per 100,000 adults (age 15+).

Mortality attributable to defendants in 2009-2010 and 2018-2019 based on McCann Section VII.A and regression analysis described above.

Mortality attributable to defendants in intervening years based on linear growth in attribution rate.